Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matters of

International Comparison and Survey Requirements in the Broadband Data Improvement Act	)	GN Docket No. 09-47
A National Broadband Plan for Our Future	)	GN Docket No. 09-51
Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act	)	GN Docket No. 09-137

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COMMENTS OF INTERNET2 – NBP PUBLIC NOTICE #1

INTRODUCTION

In connection with the development of the National Broadband Plan, the Commission is wisely seeking comments on the appropriate definitions of "broadband." For the National Broadband Plan to be successful, it is essential that broadband is properly defined.

As discussed in more detail below, Internet 2 submits these comments to strongly urge the Commission to comport with two critical principles in defining broadband. First, any definition of broadband must be sustainable for at least the next five years, and

preferably longer. It is vitally important that the definitions utilized not be outdated overnight. Otherwise, the Commission will encourage the construction of networks that will not even provide many individual consumers and businesses with access to the applications they need today, let alone a couple of years from now.[1] Such a short-sighted approach should be avoided.

Second, the definition of broadband should vary depending upon whether the services are to individual consumers on the one hand, or to businesses or community anchor institutions, such as schools, libraries and health care providers, on the other hand. Also, it may be necessary to have different definitions of broadband depending upon whether the services are wired or wireless, given that wireless services cannot provide the same bandwidth as wired services.

Because of its considerable involvement in the broadband revolution, and its critical role in the future of broadband, Internet2 brings a unique and valuable perspective to the issues in this proceeding. Moreover, to policymakers, Internet2 can serve as a window into the near-term and long-term future of broadband.

Internet2 is a not-for-profit consortium of more than 200 U.S. research universities, government agencies and laboratories, companies, and regional networks that provide advanced networking for a wide range of community anchor institutions, primarily in the research, education and health areas. Internet2 was created by the same leading U.S. research universities, that together with the federal government, created the Internet in the first place. Moreover, unlike any other organization of its kind, the Internet2 community pioneers the use of advanced network applications and technologies,

[1] In fact, the Commission should encourage the construction of networks that will last at least ten years, except for the electronics that may need to be updated in approximately five years.

from their academic inception through their evolution to the commercial Internet. In fact, the advanced national network that Internet2 operates serves as a testbed and pathfinder for where broadband can, and will most likely, go for all Americans, in their homes, their schools, and their businesses.

By bringing research and academia together with technology leaders from industry, government, and the international community, Internet2 has promoted collaboration and innovation that has had a fundamental impact on the evolution of broadband services to date, and will continue to have a fundamental impact on the future of broadband services. Internet2 has pioneered new broadband technologies, including design and operation of uncongested networks that are designed to accommodate new application innovations in real time. Internet2 has also already deployed next generation technologies as well, such as IPv6 and multicast. Internet2's nationwide deployed networks enable the next generation of data-intensive e-science, such as very large data flows from the Large Hadron Collider.

Currently, Internet2 provides a next-generation 100 Gigabit per second nationwide network that connects over 60,000 anchor institutions in the United States (including K-12 schools, community colleges, colleges and universities, federal and corporate research laboratories, libraries, museums, hospitals and clinics) and interconnects with over 80 international research and education networks. Over 10 million individuals have access to Internet2's high-speed network. The Internet2 network enables both traditional Internet Protocol (IP) network services, and brand new on-demand bandwidth services called dynamic circuit networking. The infrastructure also

provides network researchers a platform for the development of new networking ideas and protocols.

While the Commission should not define broadband to include a minimum bandwidth equal to the 100 Gbps that Internet 2 provides today, the Commission should also be careful to avoid the other extreme, and sell the American public short by defining the minimum bandwidth to be far less than that needed to support the necessary applications. Indeed, we are beginning to discover the potential of broadband technology to commerce and business, to healthcare and science, to the arts and humanities, to research and education, and beyond. In order to ensure that we move rapidly towards reaching such potential, rather than crawling at a snail's pace, it is vitally important that the Commission appropriately define broadband in this proceeding. In other words, this is not a time to stilt the country's growth by "setting the bar too low" when defining broadband.

DISCUSSION

I. Form, Characteristics and Performance Characteristics

A. *The Form that a Definition of Broadband Should Take*

The definition of broadband should be based on bandwidth (bidirectional speed of data transmission). This is the most easily verifiable means of defining broadband, and it is best suited to address the constantly changing broadband environment. Defining broadband based on applications, conversely, would be misguided. It is impossible to know what applications will exist even a couple of years from now, or what will be the necessary applications for which everyone will then want

access. Accordingly, any definition of broadband based on applications may be very quickly outdated.

Moreover, using an application-based definition would greatly complicate the issues involved, and could lead to tremendous regulatory uncertainties. For example, for each application, the Commission would be required to answer, to what extent, and at what level of quality, does the application need to be available, and there may be numerous levels of analysis involved with respect to those issues that would most likely be extremely time-consuming, fact-specific, and lead to a host of virtually impossible-to-avoid ambiguities.

B. *Whether to Develop a Single, or Multiple Definitions*

The Commission should develop at least two definitions of broadband – one for individual consumers, and another for businesses and community anchor institutions. Businesses and community anchor institutions generally have a multitude of simultaneous broadband users. Accordingly, if those entities and organizations simply receive the same bandwidth as an individual consumer, each user of the service at a business or community anchor institution would receive much poorer service than the individual consumer (because the business users are sharing the service). Yet, businesses' use of broadband services is critical to our economy, and community anchor organizations are at the heart of the broadband revolution. Community anchor organizations generally provide the public with a place to learn how to use broadband for educational, health and job-related purposes, for no fee whatsoever. Two of the most commonly cited reasons for refusing to use broadband services is lack of knowledge of how to utilize broadband and affordability. Community anchor institutions effectively

address both of these concerns. Therefore, it is critical that these institutions have bandwidth available that enables them to utilize all of the applications the public needs – not just a few of them. [2]

In addition, the Commission may wish to add a separate definition for wireless services, which simply cannot provide the same bandwidth as wired services, but can add additional mobility.

C. *Whether an Application-Based Approach to Defining Broadband Would Work*

See Section I(A) above.

D. *The Key Characteristics and Specific Performance Indicators that Should be Used to Define Broadband*

See Section I(A) above. In addition, it is important to ensure that performance indicators are publicly available.

E. *What Segment(s) of the Network Each Performance Indicator Should Measure, such as the Local Access Link to the End User, or an End-to-End Path*

The measurements should be for the end-to-end path, as that is the only means of ensuring that the consumer or business receives service with the necessary bandwidth. Measuring performance based solely on a part of the path fails to provide a complete indication of the actual performance involved from end-to-end, which is what is critical.

[2] Although separate definitions of broadband are necessary, one for individual consumers and one for businesses and community anchors, it is nevertheless critical that even the definition of broadband for individual consumers is not set too low.

F. *How Factors Such as Latency, Jitter, Traffic Loading, Diurnal Patterns, Reliability, and Mobility should Specifically be Taken into Account*

Setting minimum standards for latency, jitter, and reliability factors are critical in allowing service providers to architect their infrastructures to support the defined broadband definition. The Commission should develop a set of commonly understood and simple to implement standards in these areas. Traffic loading, and diurnal patterns are factors the Commission should leave to service providers to address.

G. *Whether Different Performance Indicators or Definitions should be Developed based on Technological or Other Distinctions, such as Mobility or the Provision of the Service over a Wired or Wireless Network*

The Commission may wish to add a separate definition for wireless services, which simply cannot provide the same bandwidth as wired services, but yet add additional mobility for consumers.

II. Thresholds

A. *What Minimum Threshold Should be Assigned to the Performance Indicators*

In defining broadband, the Commission should seek to ensure that it will not have to alter the definitions it adopts for a minimum of five years, and preferably longer. At least for wired services (because the capability already exists), the definition of broadband should reflect a bandwidth that can, for five years or more, (i) support all applications, including all video applications, currently being used by significant numbers of users; (ii) enable multiple users at the same time; and (iii) provide enough uncongested "headroom" to enable both growth and new applications/users to be accommodated.

1. Adopting Definitions of Broadband that Are Sustainable for at least Five Years Will Help Ensure that the Most Effective and Efficient Means are Used to Provide Broadband Access for All

The Commission should avoid imposing definitions of broadband that are outdated shortly after they are instituted. Such an approach would be short-sighted at best, and would ensure that the United States is always playing catch up. It would also lead to a colossal waste of resources, as networks would continue to be constructed to satisfy these low bandwidth definitions, only to find that such networks will need to be revamped or replaced to satisfy the new requirements a year or two later.

In the Broadband NOI, the Commission is seeking the "most effective and efficient mechanisms for ensuring broadband access by all people of the United States."[3] Without a doubt, the most effective and efficient means of ensuring universal access to broadband for years to come is to ensure that the infrastructure constructed to provide for broadband services can support the necessary applications for at least the next five years, and preferably even longer. Accordingly, the Commission must define broadband so as to encourage the build-out of such infrastructure, and discourage the construction of networks that will be quickly outdated in terms of the public's needs.

As Chairman Genachowski stated earlier this month:

> Broadband is the great infrastructure challenge of our generation. It is to us what railroads, electricity, highways and telephones were to previous generations -- a platform for commerce, for democratic engagement, and for helping address major national challenges.[4]

Of course, when railroads and highways were built, the government made sure that they would last for many years. The Commission needs to apply the same approach here, and

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[3] In re A National Broadband Plan for Our Future, GN Docket 09-51 (2008) ("Broadband NOI") at ¶ 9.
[4] Prepared Remarks of Chairman Julius Genachowski, Federal Communications Commission, National Broadband Plan Workshop: eGovernment and Civic Engagement (August 6, 2009).

adopt definitions of broadband that will be in effect for many years, and not outdated shortly after they are issued. Otherwise, the United States, by analogy, will constantly be in a position similar to that of the Greek mythology character Sisyphus, who was compelled to roll a huge rock up a steep hill, but before he could reach the hilltop, the rock would always roll back down again, forcing him to begin anew. We simply do not have time to begin anew again here. It is extremely important to get the definitions right this time.

2. Given the Indisputable Importance of Broadband, it is Critical that the Commission Adopt Definitions of Broadband that are Sustainable for at least Five Years

In the Broadband NOI, the Commission recognized the critical importance of broadband:

> High-speed ubiquitous broadband can help to restore America's economic well-being and open the doors of opportunity for more Americans, no matter who they are, where they live, or the particular circumstances of their lives. It is technology that intersects with just about every great challenge facing our nation.
>
> .....
>
> New, innovative broadband products and applications -- whether provided by wireline, wireless, or satellite technology – are fundamentally changing not only the way Americans communicate and work, but also how they are educated and entertained, and care for themselves and each other. [5]

Accordingly, given the undeniable importance of broadband to all individual consumers and businesses, the Commission must ensure that the "bar is not set too low," by defining broadband to include low bandwidths that cannot support the necessary applications over at least the next five years. Otherwise, the great benefits the Commission envisions in the Broadband NOI will be beyond the reach of many

[5] Broadband NOI at ¶¶ 1,4.

consumers, who will achieve a pyrrhic victory of receiving "broadband" as then defined, but not being able to utilize it for the applications they need.

In addition, the Commission recognizes in the Broadband NOI that it "must include a plan for use of broadband infrastructure and services in advancing a broad array of public interest goals, including consumer welfare, civic participation, public safety and homeland security, community development, health care delivery, energy independence and efficiency, education, worker training, private sector investment, entrepreneurial activity, job creation and economic growth, and other national purposes."[6] But to meet these goals the broadband services offered must have the ability to support the necessary applications in each of these areas, not just on the date of the issuance of the plan, but for at least five, and preferably more, years thereafter.

3. Adopting Definitions of Broadband that are Sustainable for at least Five Years will also Further the Commission's Other Goals Referenced in the Broadband NOI

Adopting a definition of broadband that is sustainable for at least five years, and preferably longer, is also consistent with the Commission's stated goal in the Broadband NOI "for every American citizen and every American business to have access to robust broadband services."[7] Obviously, broadband services will only be robust if they support all the necessary applications, not just today but also for at least several years thereafter. Quickly outdated broadband services, to say the least, certainly are not "robust."

In addition, if the definition of broadband is set too low, some consumers will not bother to subscribe to the services at all, recognizing that such services may still not

[6] Id. at ¶ 9.
[7] Id. at ¶ 5.

provide them with the applications they need. If that were to occur, the Commission's goal of achieving "maximum utilization of broadband infrastructure and service by the public" would be greatly undermined. [8]

In sum, it is high time that the United States was ahead of the curve when it comes to broadband, not behind it. The Commission has the opportunity to ensure that here, and the definitions it develops for broadband are critical in this regard.

B. *The Minimum Thresholds Necessary for Broad Classes of Applications to Function Properly*

See Section II(A) above.

C. *Whether the Commission Should Adopt Multiple, Escalating Tiers of Minimum Thresholds*

If the Commission issues rules consistent with the principles set forth herein, it may not need to adopt multiple escalating tiers of minimum thresholds.

III. Updates

A. *What Ongoing Process Should Be Put in Place to Update the Definition, Particularly the Threshold Levels*

There are too many variables involved to develop a formulaic approach based on today's data for determining when an update to the definitions is necessary. Rather, the Commission should review this issue, at least once every several years, to determine whether changes are then necessary.

B. *How Often Should Such Updates Occur*

If the Commission adopts the approach recommended herein, it should not need to update the definitions for at least five years, and perhaps longer.

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[8] Id. at ¶ 9.

C. *What Criteria Should be Used to Adjust Thresholds Over Time*

By defining broadband in a manner that will not require constant updating, the Commission will have ample time to determine how best to adjust the thresholds in the future. The Commission will be far better informed in this regard a few years from now than it is today, as by then it will have had an opportunity to observe the changing landscape of broadband over the next several years.

D. *How Modifications Over Time to the Definition Will Affect the Commission's Ability to Collect and Publish Meaningful Data on Broadband Deployment and Adoption*

If the Commission adopts definitions of broadband that will be in effect for at least five years, the Commission will be able to publish meaningful data on broadband deployment and adoption. Conversely, if there are constantly changing definitions of broadband, no one will know for sure how the United States is faring in this regard because there will be too much confusion surrounding the issues.

CONCLUSION

For all of the foregoing reasons, the Commission should define broadband in a manner consistent with the principles set forth herein.

Respectfully submitted,

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